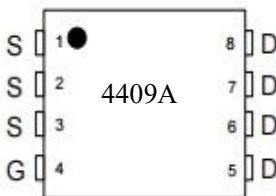
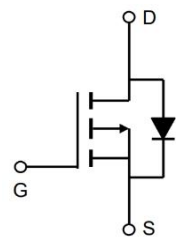


Features ➤ Super Low Gate Charge ➤ Green Device Available ➤ 100% EAS Guaranteed ➤ Excellent CdV/dt effect decline ➤ Advanced high cell density Trench technology	Bvdss	Rdson	ID
	-30V	6.6mΩ	-18A
	Application ➤ Battery Switch ➤ Load switch ➤ Power management		



Package
   Marking and pin assignment SOP-8 top view Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
4409	4409A	SOP-8	3000

Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V _{DS}	-30	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current	T _a = 25°C	I _D	-18	A
Continuous Drain Current	T _a = 100°C	I _D	-8.8	A
Pulsed Drain Current ¹		I _{DM}	-53	A
Single Pulse Avalanche Energy ²		EAS	80	mJ
Power Dissipation ²	T _C = 25°C	P _d	3	W
Junction Temperature		T _J	-55~+150	°C
Storage Temperature		T _{STG}	-55~+150	°C

Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-ambient ³	R _{θJA}	41.6	°C/W



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HL4409A	SOP-8	4	5,6,7,8	1,2,3	Tape Reel

Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-30	-	-	V
Gate-body Leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J =25°C	V _{DS} = -30V, V _{GS} = 0V	-	-	-1	μA
	T _J =100°C		-	-	-100	
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-	-2.5	V
Drain-Source On-Resistance ⁴	R _{DS(on)}	V _{GS} = -10V, I _D = -12A	-	6.6	9.8	mΩ
		V _{GS} = -4.5V, I _D = -10A	-	8.8	14	
Forward Transconductance ⁴	g _{fs}	V _{DS} = -10V, I _D = -10A	-	50	-	S
Dynamic Characteristics⁵						
Input Capacitance	C _{iss}	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz	-	3100	-	pF
Output Capacitance	C _{oss}		-	430	-	
Reverse Transfer Capacitance	C _{rss}		-	358	-	
Gate Resistance	R _g	f = 1MHz	-	9.5	-	Ω
Switching Characteristics⁵						
Total Gate Charge	Q _g	V _{GS} = -10V, V _{DS} = -15V I _D = -12A	-	35	-	nC
Gate-Source Charge	Q _{gs}		-	9.9	-	
Gate-Drain Charge	Q _{gd}		-	10.5	-	
Turn-On Delay Time	t _{d(on)}	V _{GS} = -10V, V _{DD} = -15V R _G = 3Ω, I _D = -12A	-	10.8	-	ns
Rise Time	t _r		-	13.2	-	
Turn-Off Delay Time	t _{d(off)}		-	73	-	
Fall Time	t _f		-	35	-	
Reverse Recovery Time	t _{rr}	I _F = -12A, dI _F /dt = 100A/μs	-	25	-	ns
Reverse Recovery Charge	Q _{rr}		-	10	-	nC

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Drain-source body diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$I_S = -1A, V_{GS} = 0V$	-	-	-1.2	V
Continuous Source Current $T_A=25^{\circ}C$	I_S		-	-	-14	A

Notes:

- 1.Repetitive rating, pulse width limited by junction temperature $T_J(MAX)=150^{\circ}C$.
- 2.The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L=0.1mH, I_{AS} = -40A$.
- 3.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
- 4.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 5.This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

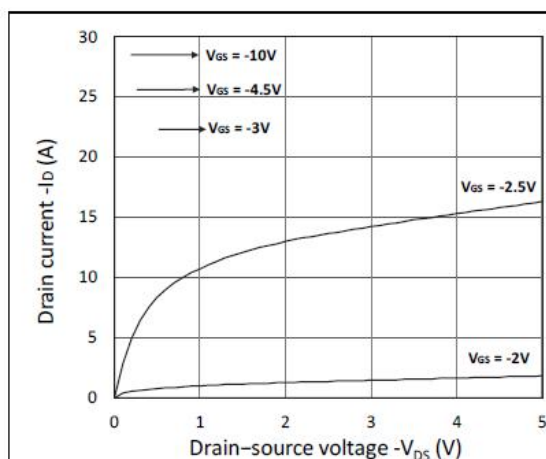


Figure 1. Output Characteristics

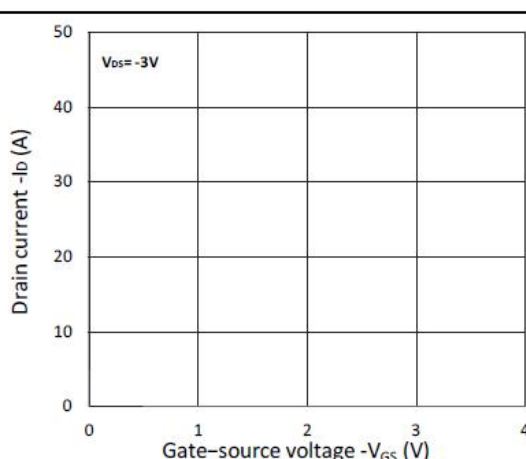


Figure 2. Transfer Characteristics

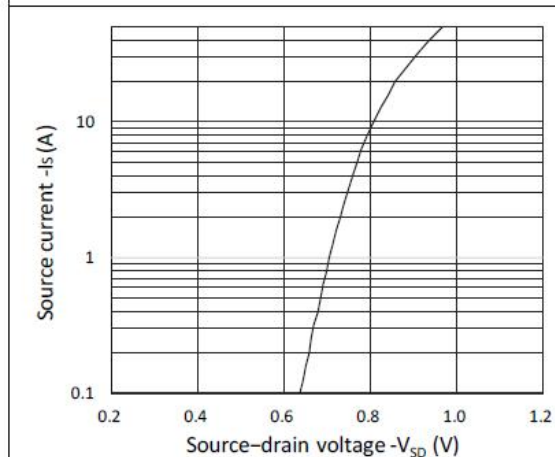


Figure 3. Forward Characteristics of Reverse

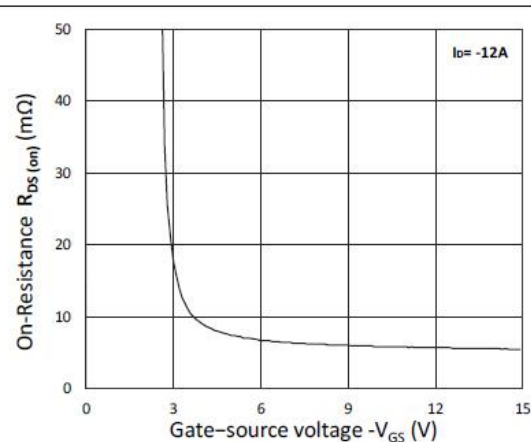


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

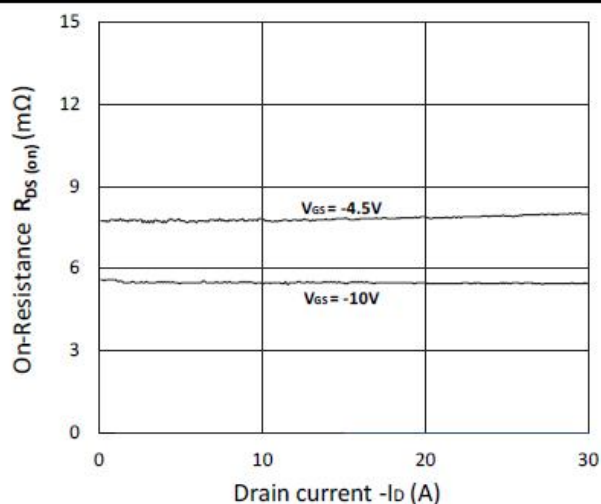


Figure 5. $R_{DS(on)}$ vs. I_D

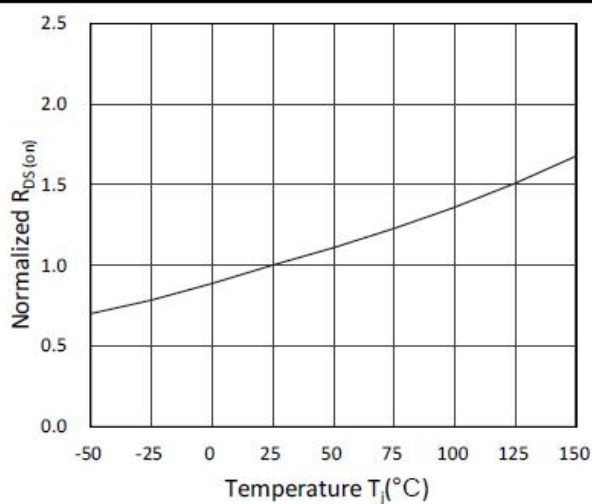


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

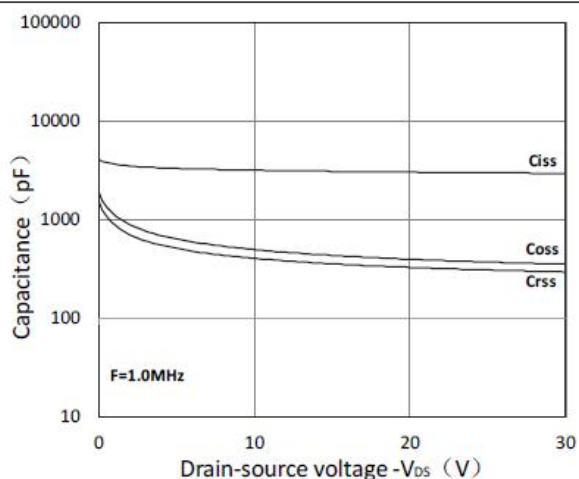


Figure 7. Capacitance Characteristics

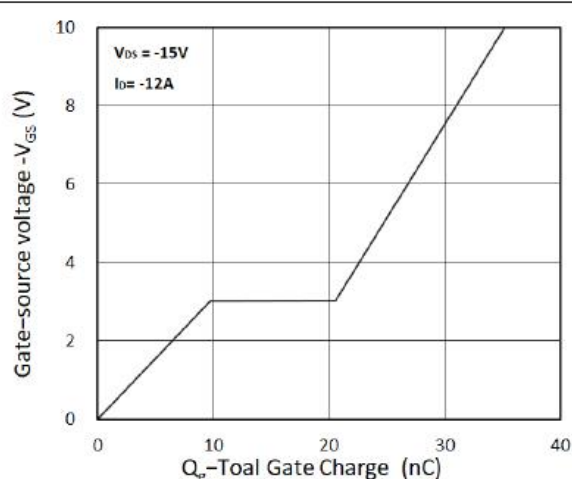


Figure 8. Gate Charge Characteristics

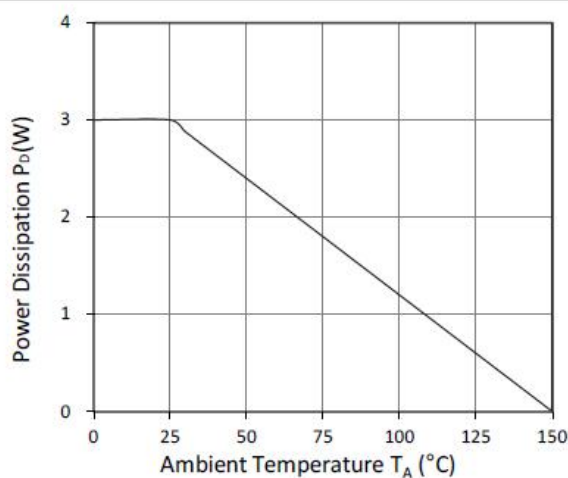


Figure 9. Power Dissipation

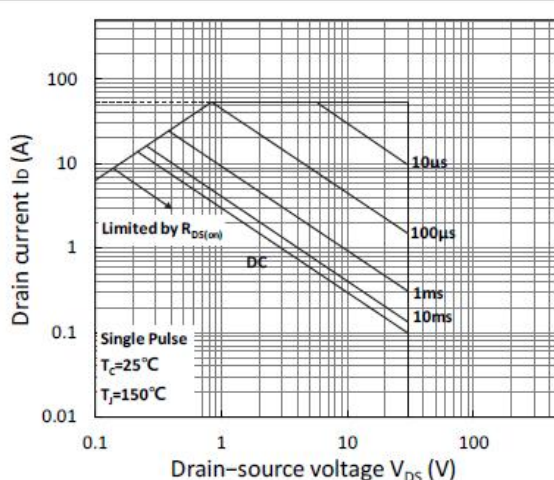


Figure 10. Safe Operating Area

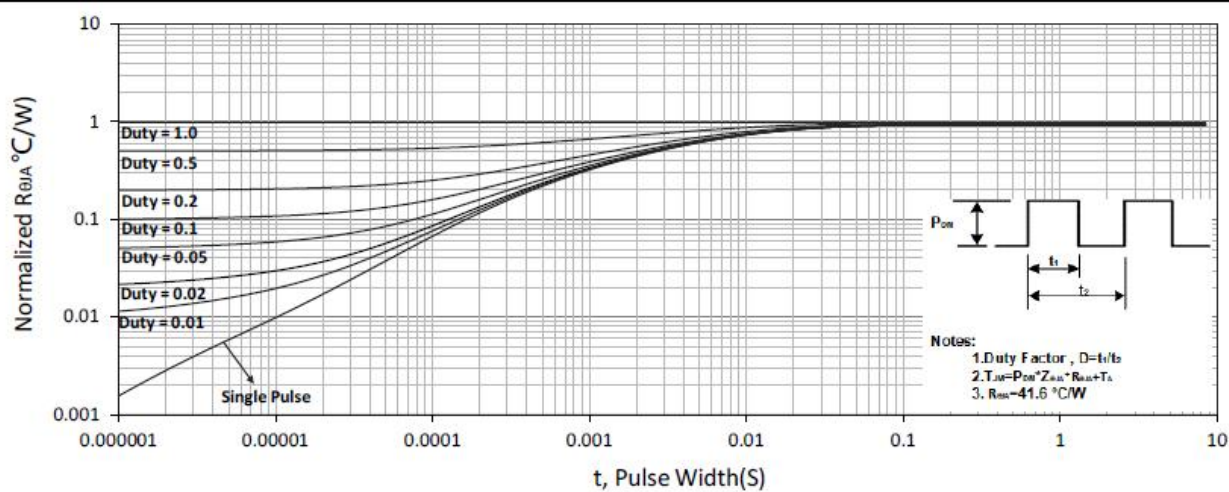


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

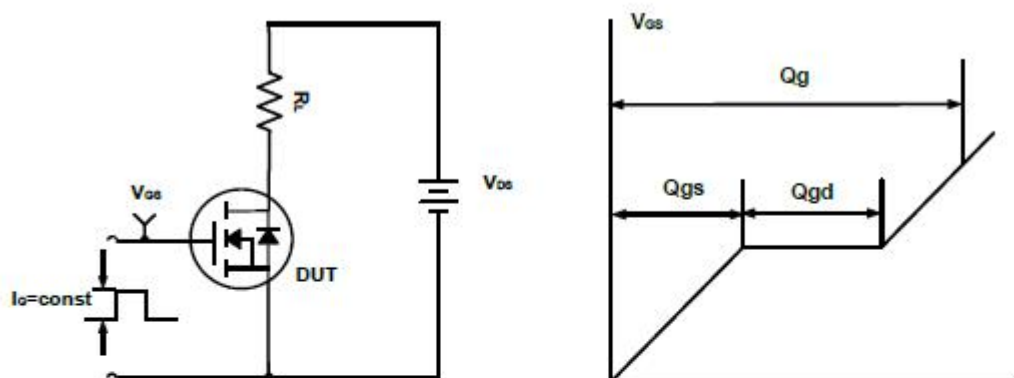


Figure A. Gate Charge Test Circuit & Waveforms

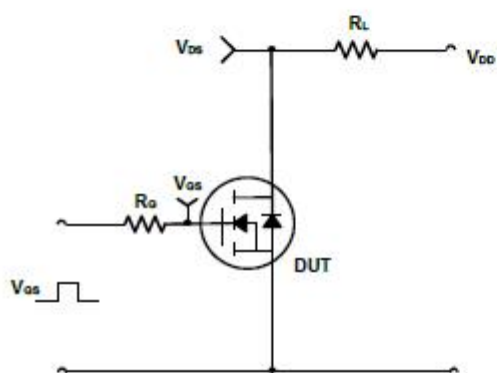


Figure B. Switching Test Circuit & Waveforms

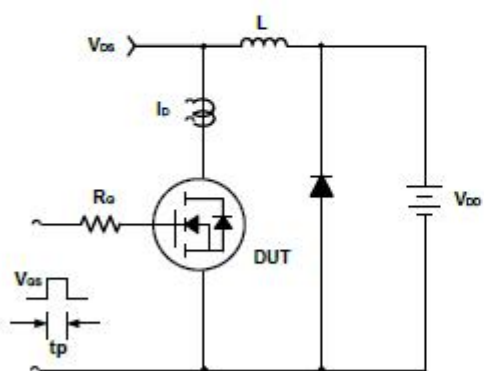
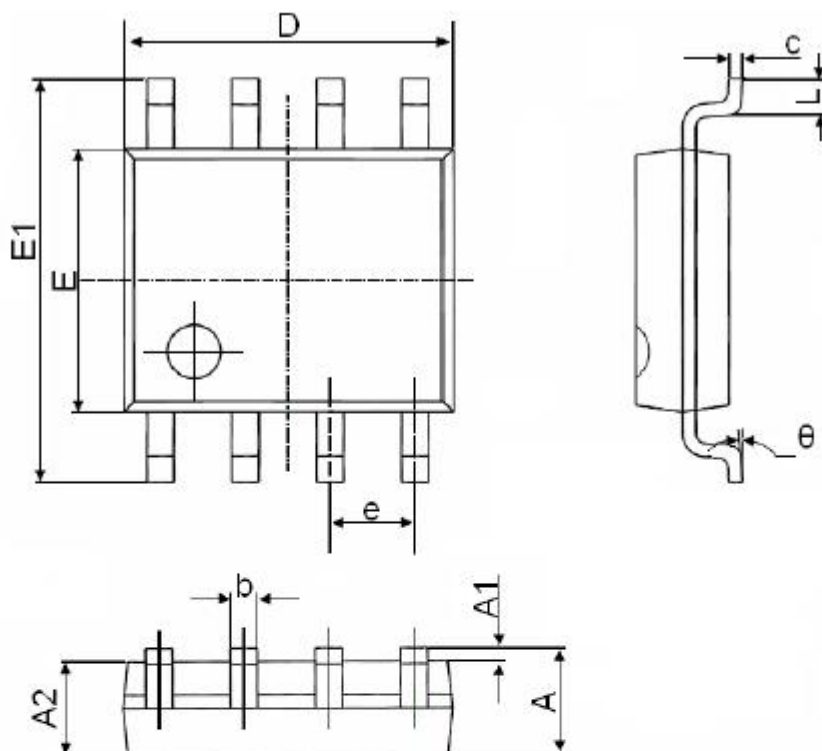


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Dimensions SOP-8


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.008	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



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